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## **Applications Report: 3D Metrology Services for Automotive Components**

### **Gear Inspection Using Robotic 3D Scanning and Optical Surface Analysis**

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## **Executive Summary**

Precision gears play a critical role in the performance and reliability of automotive powertrains, drivetrains, and motion systems. Ensuring their dimensional accuracy and surface quality is vital for noise reduction, torque transmission, and wear resistance. EDM Intelligent Solutions offers comprehensive 3D metrology services for gear inspection using advanced robotic scanning and optical measurement systems. This report highlights our capabilities and inspection results on a pinion gear.

## **Overview of 3D Metrology Capabilities**

Our 3D metrology services support full or partial inspection of gears, accommodating a wide range of geometries, tooth counts, and material types. Using our RSH-M10 Robotic 3D Metrology System, we perform detailed non-contact inspections of gear forms and surfaces, delivering  $\mu\text{m}$ -level resolution across entire gear profiles or individual teeth.

Key capabilities include:

- Full 360° gear profile measurement
- Individual gear tooth form extraction
- Pressure angle, pitch, inside and outside diameter inspection
- Profile (Ra) and area-based (Sa) surface roughness analysis
- Surface defect detection including pits, burrs, and wear

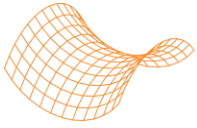
## **Application Case Study: Pinion Gear Inspection**

### **Component Overview**

- Type: Various Gear Types including Pinion Gears
- Material: Hardened Steel
- Metrology System: RSH-M10 Robotic 3D Metrology System
- Metrology Service: Form Measurement and Surface Analysis

## **Gear Inspection Process**

The gear inspection process involves a high-resolution 3D scan of the gear component using a robotic sensor arm for complete surface coverage. Both entire profiles and individual gear teeth can be captured and evaluated.



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Form measurements such as pitch diameter, outside and inside diameter, pressure angle, and root radius are extracted using profile slicing from the point cloud data. Surface analysis includes roughness evaluation using Ra and Sa metrics and visual inspection for common defects such as pitting or tool marks.

### **Results & Value Delivered**

- Non-contact inspection of gears with complex geometries
- Detailed form and dimensional validation to drawing specifications
- High-resolution surface roughness and defect detection
- Robotic scanning for consistency and repeatability
- Digital reports and traceable data for quality records

### **Conclusion**

Gears are mission-critical components in automotive assemblies, and their performance depends on strict adherence to dimensional and surface quality specifications. EDM Intelligent Solutions provides fully automated, non-contact inspection services that ensure gear integrity from prototype through production.

### **About EDM Intelligent Solutions**

EDM Intelligent Solutions is a leader in precision manufacturing and advanced metrology, serving the automotive, aerospace, and medical industries. We offer a full range of 3D inspection and electrical discharge machining services to support component quality, process control, and engineering development.